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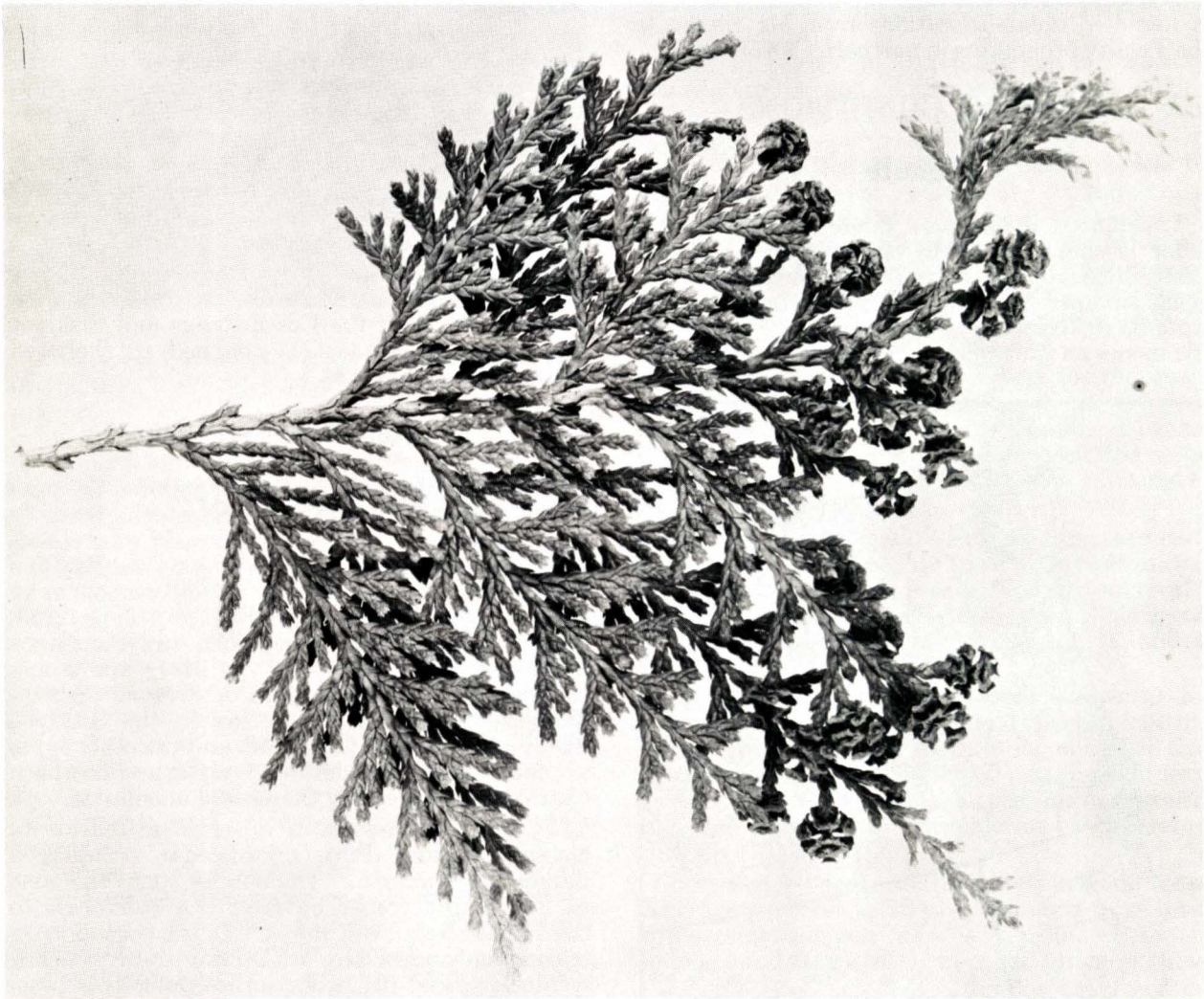
CHAMAECYPARIS

(white-cedars or false-cypresses)

Three of the six species of *Chamaecyparis* grow in North America and three others in eastern Asia in Japan and Taiwan.

The native species have much branched twigs, slightly flattened, spreading fernlike in horizontal plane. The small scalelike leaves are paired and short-pointed. They are evergreen but usually die and turn brown after the second or third year but may persist a few years longer. Leaves on seedlings are longer and awl-shaped.

A tree has male and ovulate strobili at ends of different twigs. The small rounded cones mature in 1 or 2 years but may remain attached a short time. They are composed of 6 to 12 rounded, slightly hard scales. Two to 5 small seeds with 2 short lateral wings are borne at the base of a scale. Cotyledons 2.



F–490538

PORT-ORFORD-CEDAR (*Chamaecyparis lawsoniana* (A. Murr.) Parl.)

Other common names: Port-Orford white-cedar, Lawson false-cypress, Lawson cypress, and Oregon-cedar.

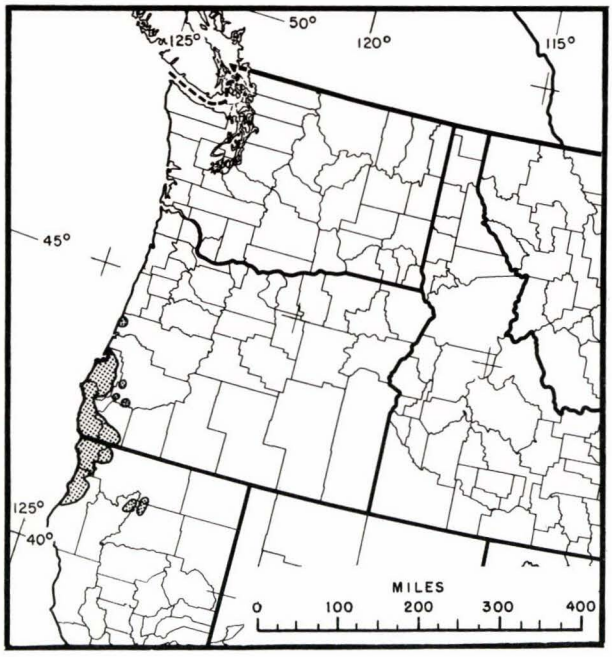
Port-Orford-cedar is the largest species of its genus and the largest representative of the tribe Cupressineae in North America. It is a highly valued timber tree and it is also planted worldwide as an ornamental.

The natural range of Port-Orford-cedar is restricted to 130 miles along the Pacific Coast from Coos Bay, Oreg., to the Mad River in California. It is abundant only west of the summit of the Coast Range and Siskiyou Mountains, not more than 10 to 40 miles from the coast. But it is scattered farther inland in the Siskiyous, and is found in isolated locations from Mt. Shasta to the Trinity Mountains in northern California.

HABITAT CONDITIONS

Climate

The climate in the main range of Port-Orford-cedar is characterized by wet winters, dry summers, unusually uniform temperatures, and frequent summer fog. Annual precipitation ranges from 65 to 70 inches along the coast to more than 100 inches on the upper slopes of the Coast Range.



The range of Port-Orford-cedar.

About 20 percent of the total falls from April through September. July and August rainfall together averages less than 1 inch at all stations.

Annual snowfall is only 1 or 2 inches along the coast but exceeds 100 inches in the higher parts of the range. Temperatures average 43° to 46° F. in January and 59° to 64° in July. Temperatures occasionally exceed 100° but have never been recorded below 0°.

Soils and Topography

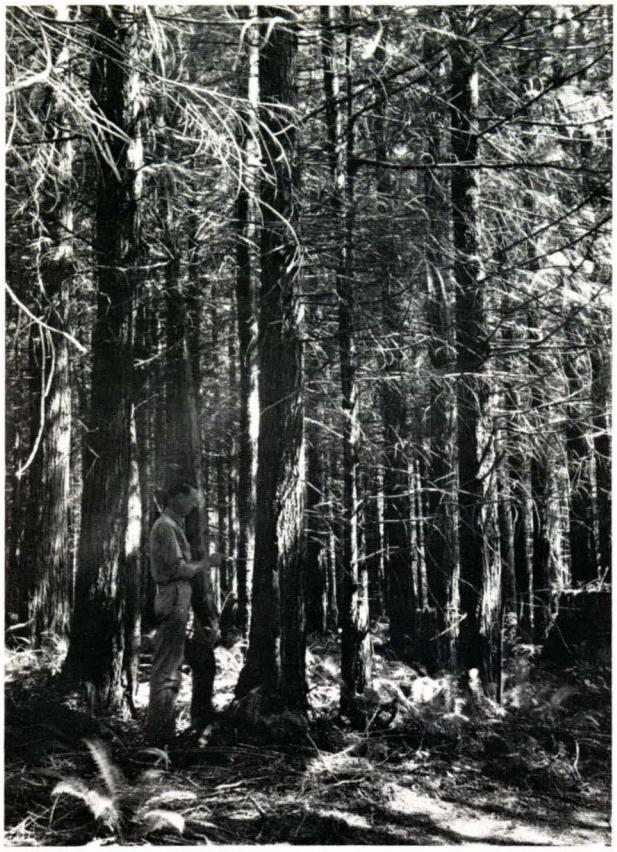
Port-Orford-cedar grows well on many kinds of soil. Although it is most abundant on medium-textured soils of coastal terraces south of Coos Bay, Port-Orford-cedar makes excellent growth and development on the sandy loams and clay loams of the Coast Range. It also grows in poorly drained, swampy soils and on dry, rocky ridges. It even grows on serpentine soils, which are generally very unfavorable for tree growth.

Port-Orford-cedar grows in all physiographic locations from near sea level to 5,000 feet on the seaward slopes of the Coast Range and Siskiyou Mountains. Inland it is confined to sheltered coves and moist places.

Associated Trees and Shrubs

Port-Orford-cedar commonly grows in mixtures, scattered through the forest singly or in small groups. However, some nearly pure stands of limited extent are found between Coos Bay and Port Orford, Oreg. It is a minor component of three forest types: Sitka Spruce (Type 223), Pacific Douglas-Fir (Type 229), and Ponderosa Pine—Sugar Pine—Fir (Type 243); and a major component of Type 231, Port-Orford-Cedar—Douglas-Fir. Type 243 occurs in the Siskiyou mountain region of California and the other types are found along the southern Oregon and northern California coast and in the coastal mountains.

Typical tree associates are rather difficult to classify because Port-Orford-cedar occupies a unique floristic area. The species spans the zone of most rapid transition from the California to the Pacific Northwest floras. In the coastal area, it commonly associates with Douglas-fir, western hemlock, grand fir, Sitka spruce, lodgepole pine, western redcedar, and sometimes redwood. Inland it is found with western white pine, sugar pine, and incense-cedar, and sometimes with pon-



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A 70-year-old stand of Port-Orford-cedar, near Port Orford, Oreg.

derosa pine and Jeffrey pine. Common hardwood associates include tanoak, Pacific madrone, golden chinkapin, red alder, Pacific dogwood, and canyon live oak.

Shrubs associated with Port-Orford-cedar are as diverse as its tree associates. The most typical shrubs in the coastal environment are salal (*Gaultheria shallon*), box blueberry (*Vaccinium ovatum*), coast rhododendron (*Rhododendron macrophyllum*), western thimbleberry (*Rubus parviflorus*), and Oregongrape (*Mahonia aquifolium*). In the Siskiyou Uplands and inland, manzanitas (*Arctostaphylos* spp.), ceanothi (*Ceanothus* spp.), and shrub forms of canyon live oak, tanoak, and golden chinkapin are common associates.

Unique species associated with Port-Orford-cedar include Brewer spruce (*Picea breweriana*), Sadler oak (*Quercus sadleriana*), and Oregon kalmiopsis (*Kalmiopsis leachiana*).

Port-Orford-cedar is not an aggressive competitor for most sites. It is tolerant enough to live under the canopies of most associates, but it must have overhead light for rapid growth.

LIFE HISTORY

Reproduction and Early Growth

Seed production and dissemination.—Some trees start to bear cones in 8 years. Cone bearing becomes general by 20 years, is best at about 100 years, and continues for the life of the tree. Seed crops are frequent; heavy crops are borne every 4 or 5 years and some seed is produced nearly every year. Cones are attacked by a gall midge (*Janetiella siskiyou*), but the damage is generally light. Squirrels do not commonly use Port-Orford-cedar seeds as food; however, in years when cones from other species are scarce, they will eat them. Caged white-footed deer mice showed dislike for the seed (*8*).[1]

Seed quality is generally poor. Most seed germinates soon after falling, but a small proportion may lie dormant for as long as 5 years before germinating (*5*).

Seedfall begins in September, reaches a maximum in winter, and continues through the spring and possibly into the summer. Of the total seedfall during the period August 29 to June 14, 7 percent was collected by October 11, 59 percent by January 4, 80 percent by February 16, and 98 percent by May 3 in 1949–50. In a 1953–54 study the percentages of total seed collected for the period were: December 3, 55 percent; February 1, 95 percent; and May 5, 100 percent. Total seedfall was about 598,000 seeds to the acre in 1949–50, and 1,268,000 to the acre in 1953–54.

Flight distance is probably short for the small-winged seeds of Port-Orford-cedar. Even western redcedar seeds, which are similar in overall size but only half as heavy, are not carried as far as the seeds of associated species such as Douglas-fir and western hemlock (*4*).

Seedling development.—New seedlings are small and delicate and probably have little resistance to heat and drought. However, seedling survival is fair. In four spot-seeding tests near Ryderwood, Wash., first-year survival was 47, 21, 72, and 49 percent (*8*).

Natural reproduction has been successful following both clear cutting and partial cutting. Either clear cutting in small units, not more than 10 chains across, or shelterwood cuttings that leave as much Port-Orford-cedar as possible in the residual stand should prove suitable for natural reproduction (*7*).

Port-Orford-cedar survives well in plantations. Average survival in 26 plantations, 8 to 26 years after establishment, was 65 percent. Browsing animals and competition were the foremost causes

[1] Italic numbers in parentheses refer to Literature Cited, p. 160.

of mortality. Ten of the plantations contained Douglas-fir, average survival of which was 61 percent (*6*).

One-year-old seedlings averaged 1.4 inches tall and 2-year-old seedlings averaged 3.1 inches tall in deer exclosure plots on the Port-Orford-cedar Experimental Forest. Planted trees (3–0 stock) averaged 18.8 inches in height 2 years after outplanting.

Vegetative reproduction.—Port-Orford-cedar does not reproduce naturally by sprouts. Cuttings, however, are not difficult to root when appropriate methods are used.

Sapling Stage to Maturity

Growth and yield.—Port-Orford-cedar is capable of moderately rapid growth, but it slows greatly if overtopped by other trees. Mature trees often are 4 to 6 feet in diameter and as tall as 200 feet. Port-Orford-cedars containing one minimum-sized saw log (32 feet long with an 8-inch top diameter) were approximately 200 years old in natural mixed stands in southwestern Oregon. Diameter at breast height of the species at various ages in typical stands is as follows:

Average age (years)	*Average d.b.h. (inches)*
100	10.7
173	19.7
251	30.7

Port-Orford-cedar in pure stands is capable of good growth. In 26 plantations from 8 to 26 years old, along the west coast from Puget Sound to northern California, average height growth was 0.83 feet per year. However, many of the plantings had been browsed by deer and domestic animals and exposed to varying degrees of competition from natural reproduction of other species. Average annual height growth was 1.15 feet on unbrowsed trees that had been subjected to only light or moderate competition.

F–325549

A stand of mature Port-Orford-cedar in Oregon.

Tree heights in the two best plantations averaged 32 feet and 40 feet at ages 14 to 19 years, respectively (*6*). In two relatively pure natural stands, the mean height of Port-Orford-cedar was 51 feet and 73 feet at ages of 36 years and 44 years. Examples of growth of Port-Orford-cedar in natural stands in western Oregon are given in table 1.

TABLE 1.—*Yield of young stands of Port-Orford-cedar in western Oregon*

Location	Stand age per acre	Total stand (all species)		Port-Orford-cedar only				
		Stems per acre	Basal area per acre	Stems per acre	Basal area per acre	Average diameter	Average height [1]	Volume per acre
	Yrs.	*No.*	*Sq. ft.*	*No.*	*Sq. ft.*	*Ins.*	*Ft.*	*Cu. ft.*
Coos-Curry County Line	44	750	408	610	287	9.3	73	7,230
Coos-Curry County Line	43	690	348	560	222	8.5	72	6,360
Coos County Forest	36	1,360	298	820	179	6.3	51	3,490
Coos County Forest	40	1,140	312	550	157	7.2	52	2,930
Port Orford	61	680	490	590	393	11.1	74	11,980
Port Orford	57	670	548	600	503	12.4	73	13,800

[1] Height of trees of mean basal area.

Reaction to competition.—Port-Orford-cedar commonly is dominant in mixed stands up to 20 or 25 years old, after which it is usually overtopped and grows slowly. But the species is shade tolerant (*2*) and long lived, and retains to a very old age the capacity to respond to release. In natural mixed stands, the Douglas-firs and other overstory trees gradually die after 250 or 300 years, releasing the persistent Port-Orford-cedars. Beyond 400 years the overstory may be composed largely of cedars, with a cedar and hemlock understory. If stands were continuously protected from fire and cutting, the climax type would probably be Port-Orford-cedar and western hemlock.

Principal enemies.—Port-Orford-cedar is subject to windthrow, especially if loaded with snow. It has no taproot, and the numerous laterals are usually of small diameter (*1*). Europeans have also found that Port-Orford-cedar is damaged by hard frosts and drying winds (*3*), and is liable to become "top dry" if planted in places that are either too wet or too dry (*9*). It has a tendency to grow multiple stems at almost any height, both in Europe and in western Oregon.

The young trees are readily killed by fire; but the old, thickbarked trees are very resistant.

The only known serious enemy of Port-Orford-cedar is a killing root disease, *Phytophthora lateralis*, which recently invaded the natural range of the species (*10*). The potential destructiveness of this disease is unknown. A white pocket heart rot, caused by an unidentified fungus, is common in old-growth stands and causes moderate losses. None of the insects that attack the species have caused serious damage.

RACES AND HYBRIDS

About 70 horticultural varieties are recognized. European foresters also recognize individuals of different appearance that seem to differ in adaptability to European conditions.

Revised from "Silvical Characteristics of Port-Orford-Cedar," by G. L. Hayes. U.S. Forest Serv. Pacific Northwest Forest and Range Expt. Sta. Silvical Ser. 7, 11 pp. 1958.

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